SNOWFALL.

The month opened with the ground generally covered with snow in the central and northern portions of the country, but it disappeared from the central districts during the first week. The snow line moved northward during the remainder of the month, so that at the close the only areas covered by snow were the extreme northeastern States and the upper and western Lake region.

The snowfall was much greater than usual from New Jersey and central Pennsylvania northward, and it also was above the normal in most districts north of the Ohio River, from 2 to 3 feet occurring in the central portions of New England and New York. In the far western mountains some additions were made to the snowfall already stored, so that at the close of the month the outlook for water for irrigation and other purposes in nearly all the western districts was the best for several years.

GENERAL SUMMARY.

The weather conditions were generally favorable for farm work in most southern sections, except that in Texas planting was delayed by dry weather. The development of vegetation was delayed by cold weather in the Middle Atlantic States, but in the central Rocky Mountain districts it was in advance of the season. The cold weather did considerable damage to truck in the southeastern States and much replanting was necessary, while some damage resulted to the peach and cherry blooms in that section as well as to early fruits in Arizona and southern New Mexico.

LOCAL STORMS IN MARCH.

The following is a brief summary of a report of a storm that passed over the north-central portion of Indiana on March 21, 1916, submitted by the official in charge of the local office of the Weather Bureau at Indianapolis, Ind.

One of the most destructive wind storms that has visited this section for a number of years swept across the north-central portion of Indiana between 9:30 and 11:30 p. m., March 21, 1916. The greatest destructive force of the storm was felt in a comparatively narrow belt, extending from the southern part of Newton County eastward to the northern portion of Jay County, on the opposite side of the State. Owing to its occurrence at night, times given for the passage of the disturbance vary somewhat; but a close comparison of the different reports secured indicates that the damaging wind was experienced in the western part of the path between 9:30 and 10 p. m., and that it crossed Cass and Miami Counties between 11 and 11:30 p. m. This would require an eastward progress of from 60 to 70 miles an hour for the translation of the disturbance, but that rate does not, of course, represent the velocity of the wind which swept the path.

No thunderstorms were reported during the day in any part of Indiana or the adjoining States, but numerous such storms occurred during the following night over the northern portions of Illinois and Ohio, accompanied by heavy rain and hail, or rain and sleet.

Practically all reports describe the destruction as due to a high wind which lasted about 5 minutes, and swept a path of from 2 to 10 miles wide. While two persons reported the observation of a funnel cloud of the tornado character, a number stated that no such cloud was observed; but it is probable that the darkness made the observation of clouds a matter of uncertainty. Practically all of the reports agree that the destructive wind blew from the northwest to southeast (in a few instances from west to east); and there is no mention made of any sudden shift in direction. In one or two places the *débris* appeared to be scattered in several directions, and one person reported observing broken timbers having a twisted appearance.

The greatest destruction appears to have been wrought in the counties of White, Cass, the northern parts of Grant and Blackford, and the southern part of Wells, but damage to a considerable extent occurred at practically all points in the path of the storm. Four persons were killed by the collapse of buildings, one was burned to death in the wreckage of his home, and many, probably a hundred, more or less severely injured. Numerous barns and buildings were demolished, several cars of a passenger train near Hanfield, Grant County, were blown from the track, and a great deal of live stock was killed. Telegraph, telephone, trolley, and electric-light wires in many parts of the region affected were blown down and the services seriously crippled. The property damage throughout the path of the storm, as conservatively estimated, will total between $1,000,000 and $1,500,000.

Average accumulated departures for March, 1916.

Districts.	Temperature.			Precipitation.			Cloudiness.		Relative humidity.	
	General mean for the current month.	Departure for the current month.	Accumulated departure since Jan. 1.	General mean for the current month.	Departure for the current month.	Accumulated departure since Jan. 1.	General mean for the current month.	Departure from the normal.	General mean for the current month.	Departure from the normal.
	°F.	°F.	°F.	Ins.	Ins.	Ins.	Per ct.		Per ct.	
New England	27.3	−5.6	− 3.9	2.76	−1.10	−2.40	5.2	−0.5	73	− 2
Middle Atlantic	35.6	−4.5	+ 0.2	3.35	−0.30	−1.60	5.6	−0.1	68	− 4
South Atlantic	52.6	−1.2	+ 6.8	1.86	−2.50	−5.70	3.9	−1.0	65	−10
Florida Peninsula	66.4	−3.9	+ 1.3	0.58	−1.70	−4.40	2.2	−1.6	71	− 6
East Gulf	56.6	−0.6	+ 5.8	1.89	−3.90	−7.20	4.1	−0.9	67	− 6
West Gulf	61.9	+4.0	+10.4	1.16	−2.00	−2.50	3.9	−1.2	61	−11
Ohio Valley and Tennessee	41.7	−2.4	+ 1.7	3.50	−0.90	+0.10	6.1	+0.1	70	− 1
Lower Lakes	27.3	−5.6	− 2.8	3.00	+0.40	+0.60	6.0	−0.6	78	+ 2
Upper Lakes	23.7	−3.9	− 3.6	2.63	+0.40	+0.60	6.2	+0.2	80	+ 1
North Dakota	21.2	+0.3	− 9.9	1.67	+0.70	+0.90	5.8	+0.2	84	+ 6
Upper Mississippi Valley	36.5	+0.5	+ 1.7	1.81	−0.60	+1.10	6.0	+0.3	75	+ 2
Missouri Valley	40.7	+4.6	+ 2.1	1.46	−0.50	−2.30	5.3	−0.4	71	− 1
Northern slope	37.3	+6.5	− 4.4	0.93	−0.20	+0.10	5.9	+0.5	62	− 5
Middle slope	48.3	+5.8	+ 5.0	0.90	−0.60	−0.40	4.5	−0.1	52	− 8
Southern slope	60.2	+7.1	+14.7	0.78	−0.10	−1.20	2.8	−1.6	37	−15
Southern Plateau	55.0	+4.0	+ 4.6	0.52	0.00	+1.80	2.9	−0.8	40	+ 4
Middle Plateau	45.2	+4.2	+ 3.5	1.13	−0.10	+1.40	3.8	−1.2	51	− 5
Northern Plateau	43.8	+3.6	− 3.5	1.97	+0.40	+1.50	7.3	+1.5	63	− 3
North Pacific	45.4	+0.6	− 4.4	9.45	+4.40	+5.60	7.8	+1.2	81	+ 6
Middle Pacific	53.6	+2.3	+ 2.1	1.82	−2.40	+2.70	4.2	−1.2	70	− 4
South Pacific	59.1	+4.0	+ 1.8	1.45	−1.20	+6.20	3.5	−2.3	72	+ 1

WEATHER CONDITIONS OVER THE NORTH ATLANTIC DURING MARCH, 1915.

The data presented are for March, 1915, and comparison and study of the same should be in connection with those appearing in the REVIEW for that month. Chart IX (XLIV–33) shows for March 1915 the averages of pressure, temperature, and prevailing direction of the wind at 7 a. m., 75th Meridian time, together with the locations and courses of the more severe storms of the month.

PRESSURE.

The distribution of pressure for the month was abnormal in nearly all respects, and the average values were below the normal over the greater part of the ocean. The highest monthly average of the barometric readings

for any one 5-degree square was 30.05 inches, occurring in the vicinity of Ireland and there was no locality between the 20th and 77th meridians where the mean of the barometric readings for the month was as high as 30 inches. A limited area with a crest of 30 inches surrounded the Canary Islands, while there was another area of the same intensity and of somewhat greater extent, central near the south coast of Ireland. The most remarkable feature of the average pressure distribution was the low of 29.3 inches central near St. Johns, Newfoundland, where the normal pressure is about 29.8 inches. It can be seen that the two great centers of action, the Azores HIGH and the Icelandic LOW, were practically missing, and this fact, together with the development of the low mentioned above, was responsible for the unusual conditions of wind and weather over certain parts of the ocean referrred to later on.

STORMS.

The number of gales east of the 23rd meridian was somewhat below the normal, while in the central and western regions the opposite held true. The greatest number of gales in any one 5-degree square occurred between the 40th and 45th parallels and 40th and 45th meridians, where they were reported on 12 days, or a percentage of 39, the normal percentage for the square being 21. Three of these gales occurred in the first decade of the month, 2 in the second, and 7 in the last 11 days. The distribution of gales throughout the month varied considerably in different localities, as in the waters adjacent to the American coast, between the 35th and 40th parallels, 9 of the 10 gales reported occurred on the first 12 days of the month, while in some regions in mid-ocean they were more evenly divided and in others most of the heavy winds prevailed during the first and last decades of the month, leaving the middle period comparatively free.

Four storm tracks are shown on Chart IX, and there were other disturbances whose paths were either too uncertain to plot accurately or else their centers were indeterminate on account of lack of observations.

On March 1 a LOW (I on Chart IX) was central near St. Johns, Newfoundland, and light to moderate west and northwest winds prevailed over a large area south of the center. It moved about 7 degrees south within the next 24 hours, the wind increasing somewhat in force, and then recurved to the northeast. From the 2d to the 4th the rate and direction of movement were comparatively uniform, the wind continuing to increase in velocity. During the 4th, when the center was near latitude 47°, longitude 41°, several vessels in the area west of the 40th meridian and between the 30th and 40th parallels, reported heavy gales of over 60 miles an hour, with rain and hail. The storm then turned toward the southwest, moving rapidly, as on the 5th the center was near latitude 38°, longitude 47°, while the condition of the wind and weather was similar to that of the day before. The disturbance then turned toward the northeast, decreasing in its rate of movement, and on the 6th it was near latitude 40°, longitude 44°. In the regions north and west of the center winds of gale force were reported, while toward the east and south they were moderate. This LOW then began to fill in, and on the 7th it was not well enough defined to plot, and no trace of it could be seen on the 8th. This storm was remarkable for its irregularity in both rate of speed and direction of movement, although it was not accompanied by especially heavy gales.

On March 8 a LOW of 29.20 inches (II on Chart IX) was central about 10° east of Hatteras, causing north and northwest gales along the coast between Norfolk and central Florida. This moved in a northeasterly direction, increasing in intensity, and on the 9th was central near latitude 39°, longitude 58°. The barometer fell to 28.60 inches and the wind increased in force, the steamship *Sylvanian* (Br.), about 4° west of the center, reporting a northeasterly hurricane of 90 miles or over, and several other vessels in the same general locality encountered extremely heavy winds with rain and hail. Continuing in the same direction, it was central near latitude 43°, longitude 52°, on the 10th; the barometer remained practically stationary, and gales of from 40 to 60 miles an hour prevailed over a large area, with hail and rain. The path of the storm then turned at right angles to the northwest, and on the 11th the center was near St. Johns, Newfoundland, the barometer having risen to 28.90 inches and the wind moderated considerably, although three vessels east of Hatteras, between the 67th and 72d meridians, reported northwest gales of from 40 to 50 miles.

On Chart III (XLIII–34, March 1915) showing tracks of centers of LOWS for March, 1915, a LOW (III on Chart IX) is shown that first appeared in eastern California on the evening of March 12. This moved in a southeasterly direction, and did not appear within the limits of Chart IX until the morning of the 14th, when it was located near the southeast corner of the boundary between New Mexico and Texas. From this point the movement was nearly due east, until the evening of the 16th, when the LOW was central in the vicinity of Raleigh, N. C. From this point it turned slightly toward the north, and on the 17th was near latitude 39°, longitude 65°, winds of from 35 to 50 miles prevailing in the southwest quadrant. It then curved still more toward the north, and on the 18th was about 6 latitude degrees east of Halifax, the barometer falling to 29 inches and the wind increasing southward of the center with heavy gales, hail, and rain over a large area. The storm then curved toward the northwest, and decreasing in its rate of movement was central at Sydney, C. B. I., on the 19th. The barometer had risen slightly since the day before, and the storm area had decreased somewhat in extent, although westerly and northwesterly gales of from 40 to 50 miles, with hail and rain, were encountered south of the center. The LOW continued its movement toward the northwest, and on the 20th was over the Gulf of St. Lawrence, the barometer having risen and the wind decreased in force since the 19th.

On March 21 a LOW of 29.35 inches (IV on Chart IX) is shown near latitude 42°, longitude 64°. The wind ranged from light to moderate, while rain, hail, and snow were all reported by a number of vessels. From this point it rapidly moved eastward, and on the 22d was near latitude 44°, longitude 48°, the barometer having fallen to 28.68 inches, and the winds increased in force; gales of over 50 miles an hour were encountered in its southern quadrant. It continued in its easterly direction, and on the 23d was near latitude 44°, longitude 40°, the barometer falling to 28.49 inches, although the velocity of the wind had not changed materially since the day before. LOW IV then curved sharply toward the north, the rate of translation having decreased, and on the 24th it was near latitude 46°, longitude 38°, the pressure and wind force having changed but little. From this point it changed its course toward the east, and on the 25th recurved again toward the north, so that on the 26th it was near latitude 48°, longitude 38°, where a number

of vessels south of the center reported gales of from 40 to 50 miles.

From March 27 to 31, inclusive, a practically stationary LOW was central near St. Johns, Newfoundland. The barometer readings ranged from 29.28 inches on the 29th to 28.60 inches on the 31st, and heavy gales with rain and hail prevailed on every day during the period with the exception of the 30th, when only moderate winds were reported.

TEMPERATURE.

In mid-ocean and in the waters adjacent to the European coast the temperatures were as a rule somewhat above the normal, the departures ranging from 0 degrees near the coast of France to +4 in a number of 5-degree squares between the 45th and 55th parallels and the 20th and 40th meridians. The abnormal distribution of the mean pressure for the month was responsible for the unusual condition of the wind and temperature that were influenced by the low, central near St. Johns. The cyclonic character of the circulation around the center was very marked, and the easterly winds that prevailed in the northern part of the area caused positive temperature departures of from 2 to 5 degrees, while south of Portland, in the waters adjacent to the American coast, where the winds were from the north and the northwest, they ranged from 0 near the 43d parallel to −7 degrees off the coast of Florida, and were about the same in the northern portion of the Gulf of Mexico. The departures at a number of Canadian and United States Weather Bureau stations on the Atlantic and Gulf coasts were as follows: St. Johns, N. F., +5.1°; Sydney, C. B. I., +3.4°; Eastport, +1.0°; Portland, +0.2°; Nantucket, −1.8°; New York, −1.1°; Baltimore, −2.5°; Norfolk, −5.3°; Hatteras, −6.2°; Charleston, −7.6; Jacksonville, −6.1°; Key West, −7.2°; Pensacola, −8.0°; New Orleans, −7.0°; and Galveston, −8.5°.

The lowest temperature recorded during the month was 18° F. on the 5th, 8th, 9th, and 13th, and occurred in the 5-degree square between the 50th and 55th parallels and the 55th and 60th meridians. The highest temperature was 82°F. and occurred on a number of days in the waters adjacent to the Isthmus of Panama.

FOG.

The percentage of days with fog off the Banks of Newfoundland, as given on the normal Meteorological Chart for March ranges from 40 to 45, while in March, 1915, fog was only observed on one day in that locality. This was probably due to the almost continuous presence of the low area central near St. Johns and the consequent heavy westerly and northwesterly winds that prevailed during the greater part of the month. The greatest number of days on which fog was observed occurred in the two 5-degree squares between the 45th and 50th parallels and the 15th and 25th meridians, where it was reported on three days, or a percentage of 10; the normal percentage for that locality being 5. The steamer tracks were remarkably free from fog, and over a large portion of the routes none was observed.

PRECIPITATION.

Snow was reported on 6 days off the New England coast, where the maximum amount fell. No snow was reported from east of the 50th meridian. Hail occurred on 5 days in the same region where the number of days with snow was the highest and was rarely seen on the steamer routes.

Maximum wind velocities.

Stations.	Date.	Velocity.	Directions.	Stations.	Date.	Velocity.	Directions.
		Mls./hr.				*Mls./hr.*	
Atlanta, Ga.	3	50	nw.	Mt. Tamalpais, Cal.	23	63	nw.
Do.	15	50	nw.	Do.	24	62	nw.
Block Island, R. I.	4	54	n.	Do.	27	54	nw.
Do.	5	52	nw.	Do.	30	57	n.
Do.	8	56	nw.	Nantucket, Mass.	3	63	ne.
Do.	9	52	w.	Do.	4	67	ne.
Do.	17	54	nw.	Nashville, Tenn.	7	52	w.
Buffalo, N. Y.	7	80	w.	Do.	22	51	sw.
Do.	8	56	sw.	New York, N. Y.	4	50	nw.
Do.	9	52	w.	Do.	5	64	nw.
Do.	10	66	w.	Do.	16	58	w.
Charlotte, N. C.	3	54	nw.	Do.	17	57	nw.
Do.	22	54	sw.	Do.	20	50	nw.
Chattanooga, Tenn	22	50	nw.	Norfolk, Va.	4	51	nw.
Cheyenne, Wyo.	2	50	nw.	North Head, Wash	2	66	s.
Do.	3	64	w.	Do.	5	64	s.
Do.	4	54	w.	Do.	7	70	s.
Do.	5	56	w.	Do.	8	59	s.
Do.	6	70	w.	Do.	19	56	s.
Do.	8	74	nw.	Do.	21	82	s.
Do.	9	50	nw.	Do.	24	60	se.
Do.	20	78	nw.	Do.	26	50	s.
Cincinnati, Ohio	7	52	w.	Oklahoma, Okla.	14	50	n.
Cleveland, Ohio.	9	56	sw.	Pensacola, Fla.	25	51	s.
Columbus, Ohio.	7	70	w.	Point Reyes Light, Cal.	1	64	nw.
Concordia, Kans.	21	52	nw.	Do.	4	56	s.
Dayton, Ohio.	7	55	sw.	Do.	5	56	nw.
Del Rio, Tex.	24	50	nw.	Do.	22	70	nw.
Duluth, Minn.	9	57	w.	Do.	23	81	nw.
Eastport, Me.	8	56	ne.	Do.	24	50	nw.
Do.	9	56	ne.	Do.	28	58	nw.
El Paso, Tex.	21	50	w.	Pueblo, Colo.	21	50	w.
Do.	22	57	sw.	St. Louis, Mo.	22	54	w.
Erie, Pa.	6	53	se.	St. Joseph, Mo.	21	56	nw.
Do.	10	52	s.	Do.	22	56	nw.
Do.	27	52	e.	Salt Lake City, Utah.	5	53	nw.
Evansville, Ind.	7	62	sw.	Sand Key, Fla.	8	52	nw.
Fort Smith, Ark.	25	52	sw.	Do.	16	50	n.
Green Bay, Wis.	22	50	n.	Sandy Hook, N. J.	4	52	nw.
Hatteras, N. C.	3	57	nw.	Do.	5	50	nw.
Do.	4	51	nw.	Savannah, Ga.	3	52	nw.
Indianapolis, Ind.	7	56	w.	Do.	15	50	nw.
Jacksonville, Fla.	22	52	sw.	Sheridan, Wyo.	21	50	nw.
Kansas City, Mo.	7	50	nw.	Sioux City, Iowa.	6	58	nw.
Do.	21	60	w.	Do.	7	50	nw.
Do.	22	56	nw.	Toledo, Ohio.	7	51	sw.
Lander, Wyo.	5	58	w.	Do.	9	57	sw.
Lexington, Ky.	7	62	nw.	Tatoosh Island, Wash.	2	61	sw.
Do.	22	56	w.	Do.	3	53	sw.
Lincoln, Nebr.	7	50	nw.	Do.	5	62	s.
Do.	21	50	nw.	Do.	7	58	s.
Do.	22	54	nw.	Do.	12	50	sw.
Louisville, Ky.	6	52	w.	Do.	14	56	ne.
Do.	7	72	w.	Do.	21	56	s.
Do.	22	70	w.	Do.	26	51	s.
Lynchburg, Va.	22	54	w.	Wichita, Kans.	21	50	w.
Memphis, Tenn.	7	50	w.				
Mt. Tamalpais, Cal.	1	60	sw.				
Do.	20	50	nw.				
Do.	21	58	nw.				